

PM_{2.5} Sulfate and Organic Carbon Estimates for 2010

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SAMI

- The Southern Appalachian Mountains Initiative (SAMI) is an organization established in 1992 by air directors of the 8 southern Appalachian states (AL, GA, KY, NC, SC, TN, VA, WV).
- SAMI is developing strategies for improving air quality in Class I areas within southern Appalachians.



Base Year Episodes

- SAMI commissioned air quality modeling of episodes during base years of 1991-1995.
- Episodes were selected to be statistically representative of ozone, fine particles and acid deposition during base years at Shenandoah and Great Smoky Mts.



Projections of Future Air Quality

- Projections of air quality to 2010 & 2040 were modeled & results compared to base year conditions.
- SAMI developed emissions inventories for different futures, including a so-called “On the Way” , or A2, scenario.



Applicability of Results

- SAMI modeling is oriented toward selected Class 1 areas.
- Results for wider region can be examined for sense of where air quality is likely headed. Site-specific modeling needed for refined projections in urban areas.
- Projections are sensitive to emission assumptions.



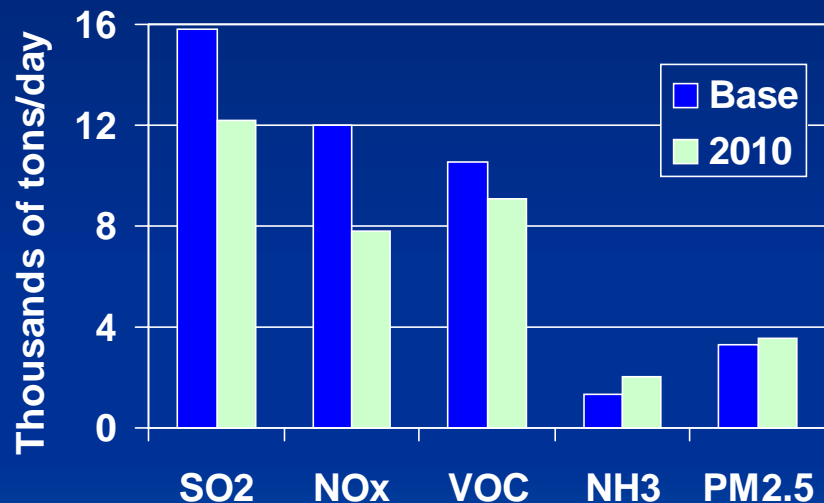
2010 “A2” Emissions

- Title-IV implementation
- Implementation of existing 1-hr O₃ SIPs
- Implementation of EPA Section 126 NO_x reductions for O₃ season
- Implementation of low-S fuel rules
- <20% VMT penetration for Tier-II motor vehicle rules

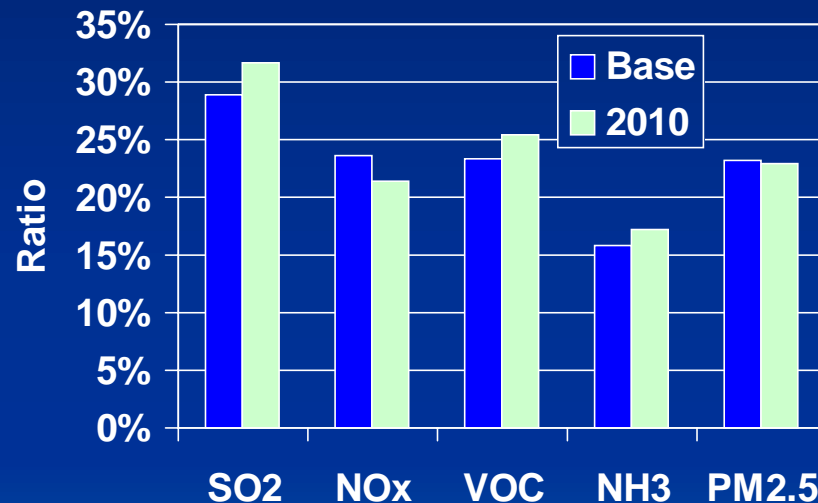


Base Years vs. 2010 Anthropogenic Emissions

8 SAMI States



SAMI States / Domain Emissions



Modeling

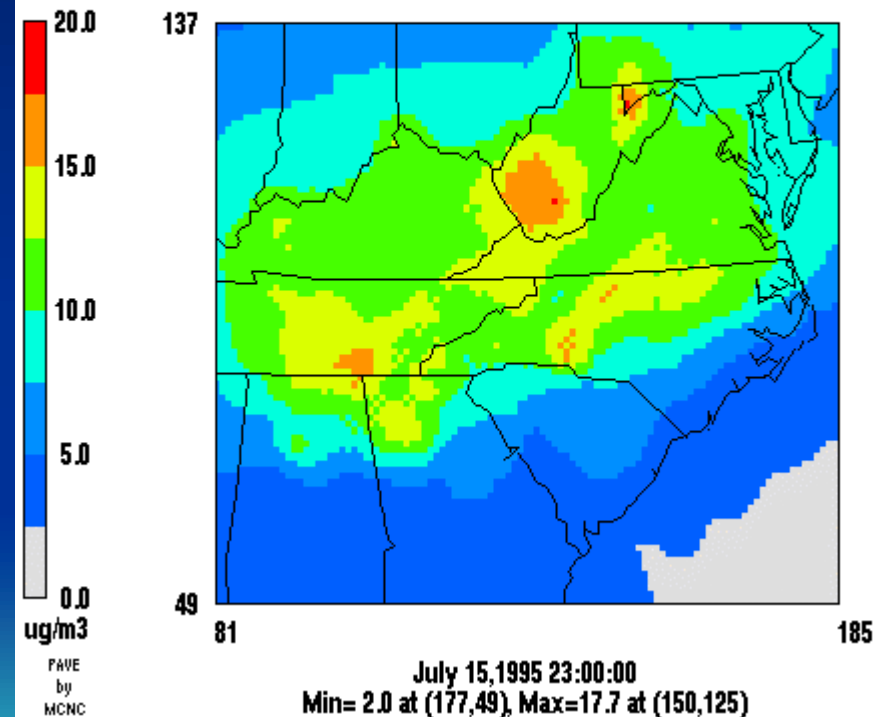
- Model: URM-1ATM developed at GIT
- Episodes: 69 days representing 1 winter, 4 spring and 4 summer periods
- Full range of air quality conditions modeled, including high $PM_{2.5}$ days.
- Model results were evaluated for base periods. Good performance was found for sulfate and organic carbon.



Changes in Daily Sulfate Aerosol: Example of High Sulfate Day

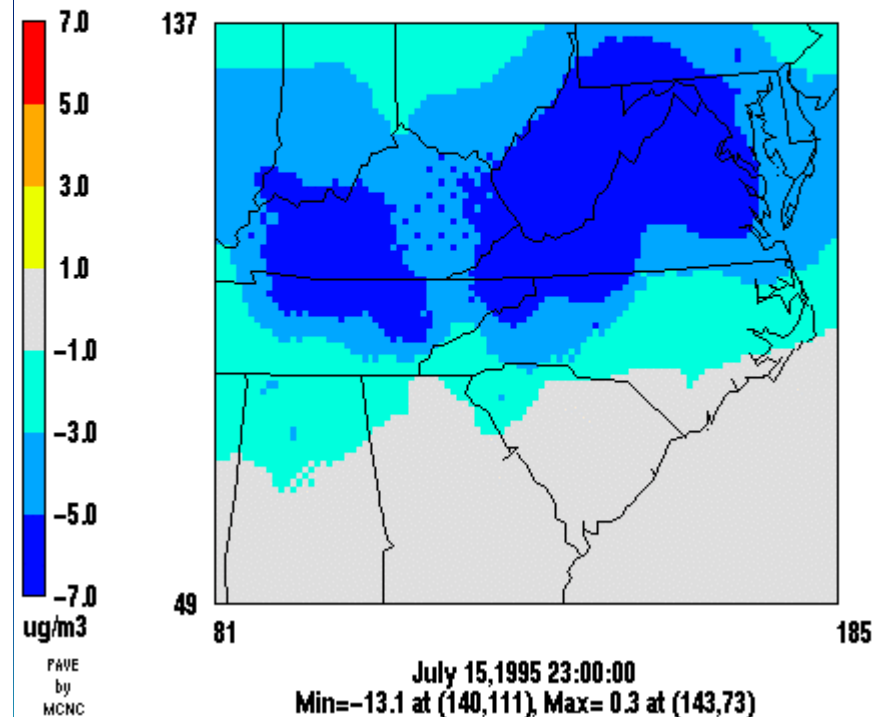
Sulfate 2.5

2010 OTW Daily Average
(Created 03/11/01)



Change in Sulfate 2.5

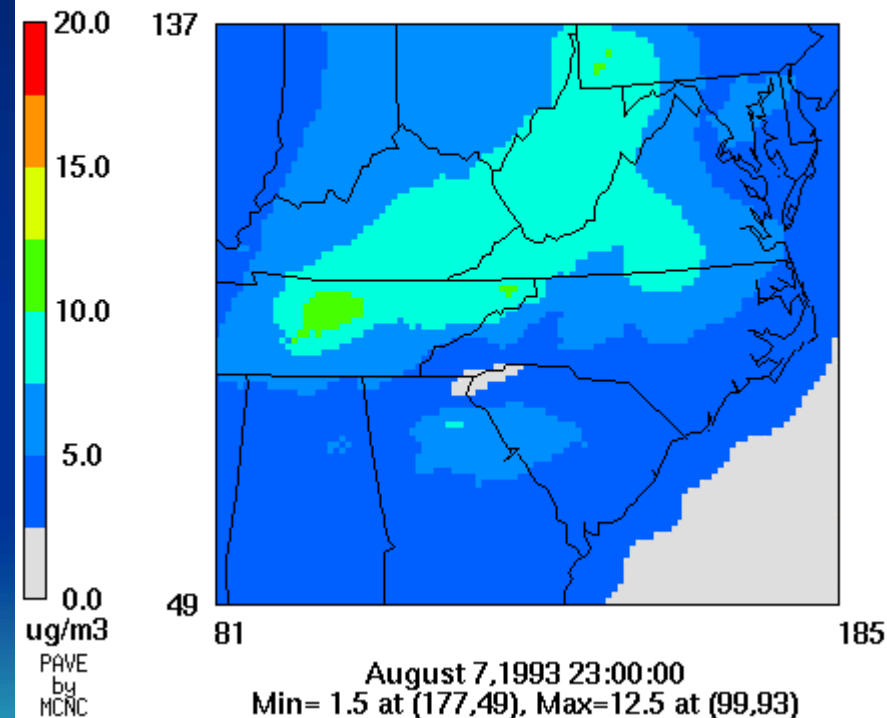
2010_OTW-1995
(Created 07/26/00)



Changes in Daily Sulfate Aerosol: Example of Moderate Sulfate Day

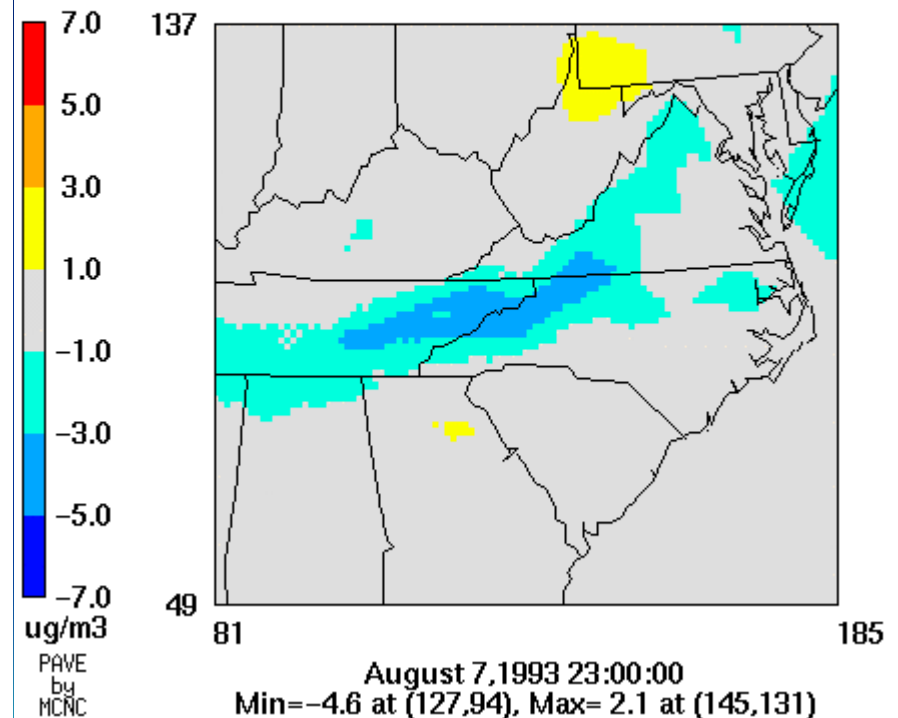
Sulfate 2.5

2010 OTW Daily Average



Change in Sulfate 2.5

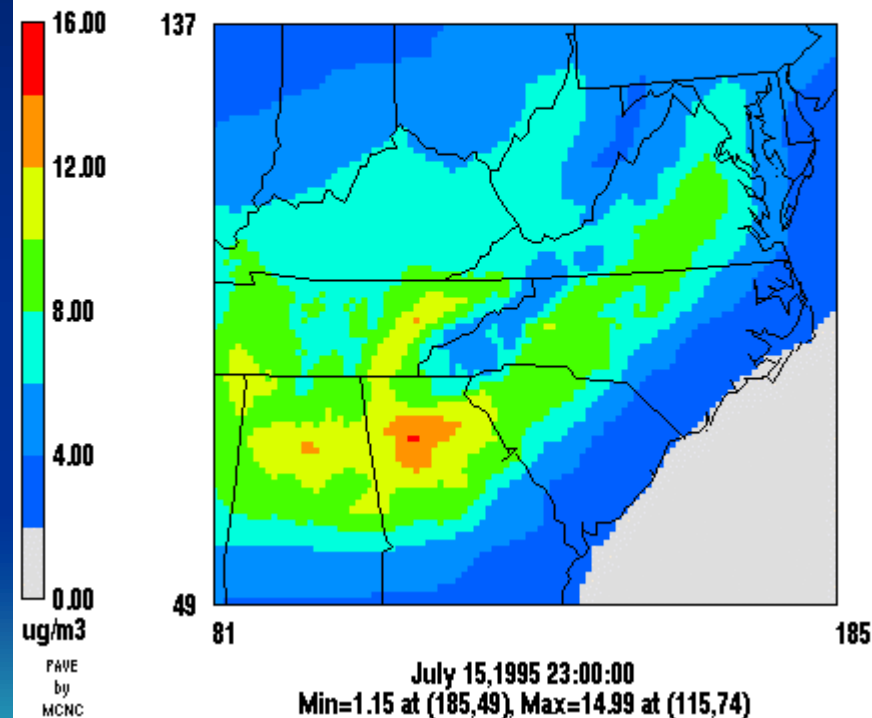
2010 OTW - 1993



Changes in Daily Organic Aerosols: Example of High OC Day

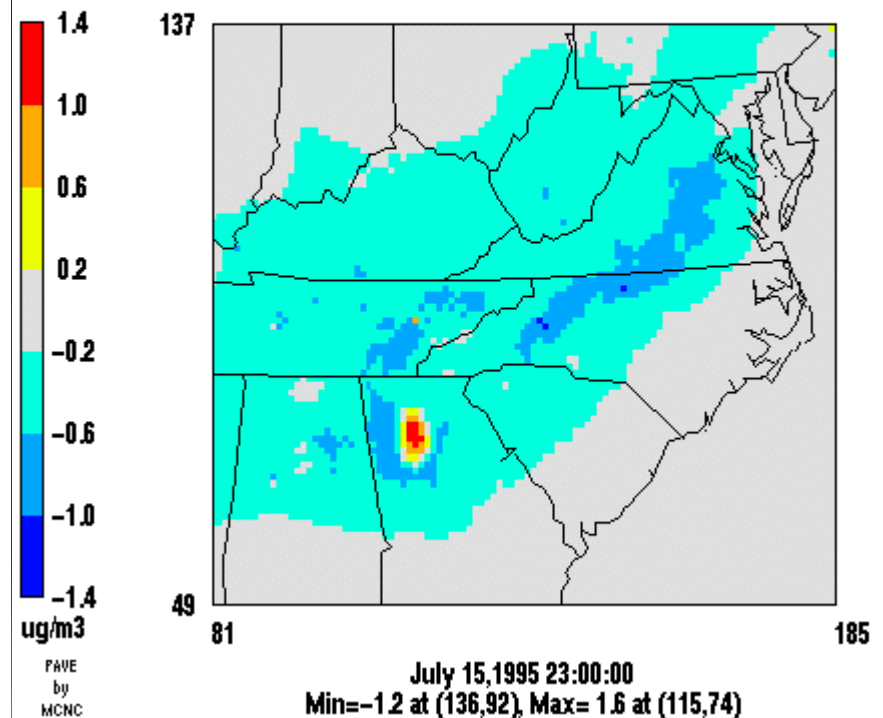
Organics 2.5

2010 OTW Daily Average
(Created 03/11/01)



Change in Organics 2.5

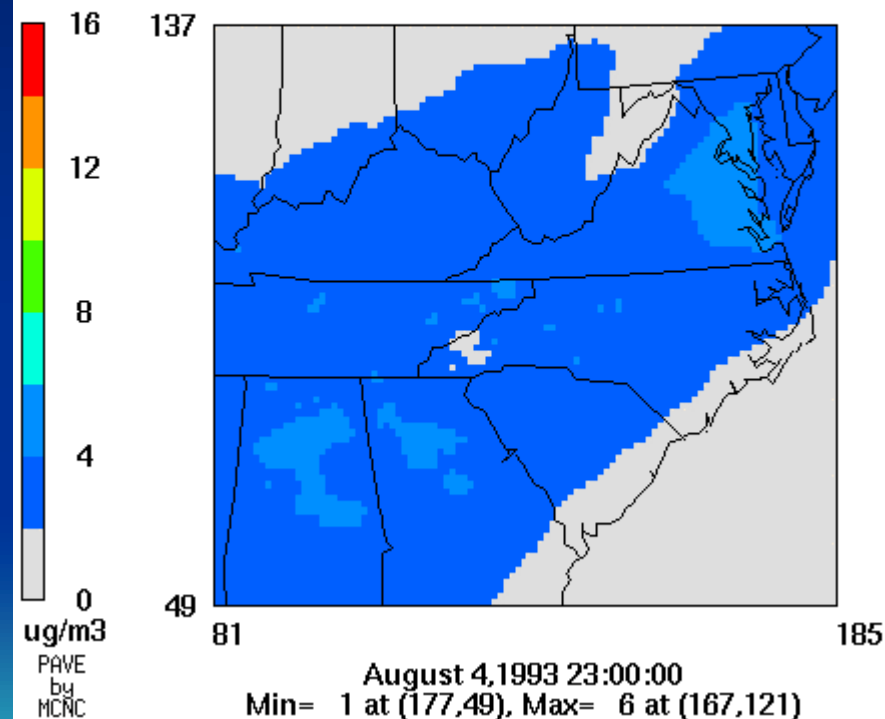
2010 OTW-1995
(Created 07/26/00)



Changes in Daily Organic Aerosols: Example of Moderate OC Day

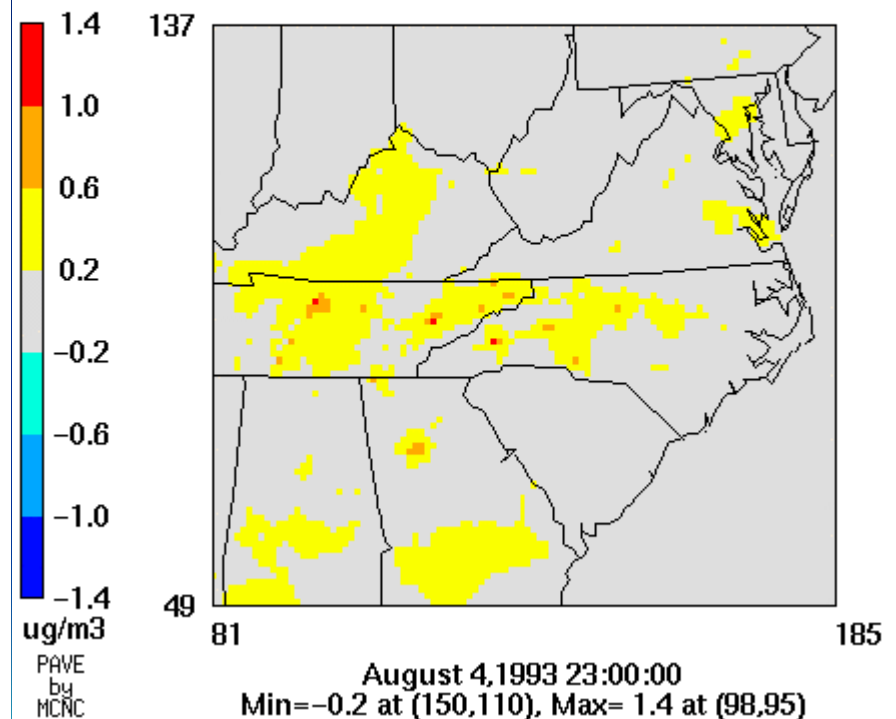
Organics 2.5

2010 OTW Daily Average

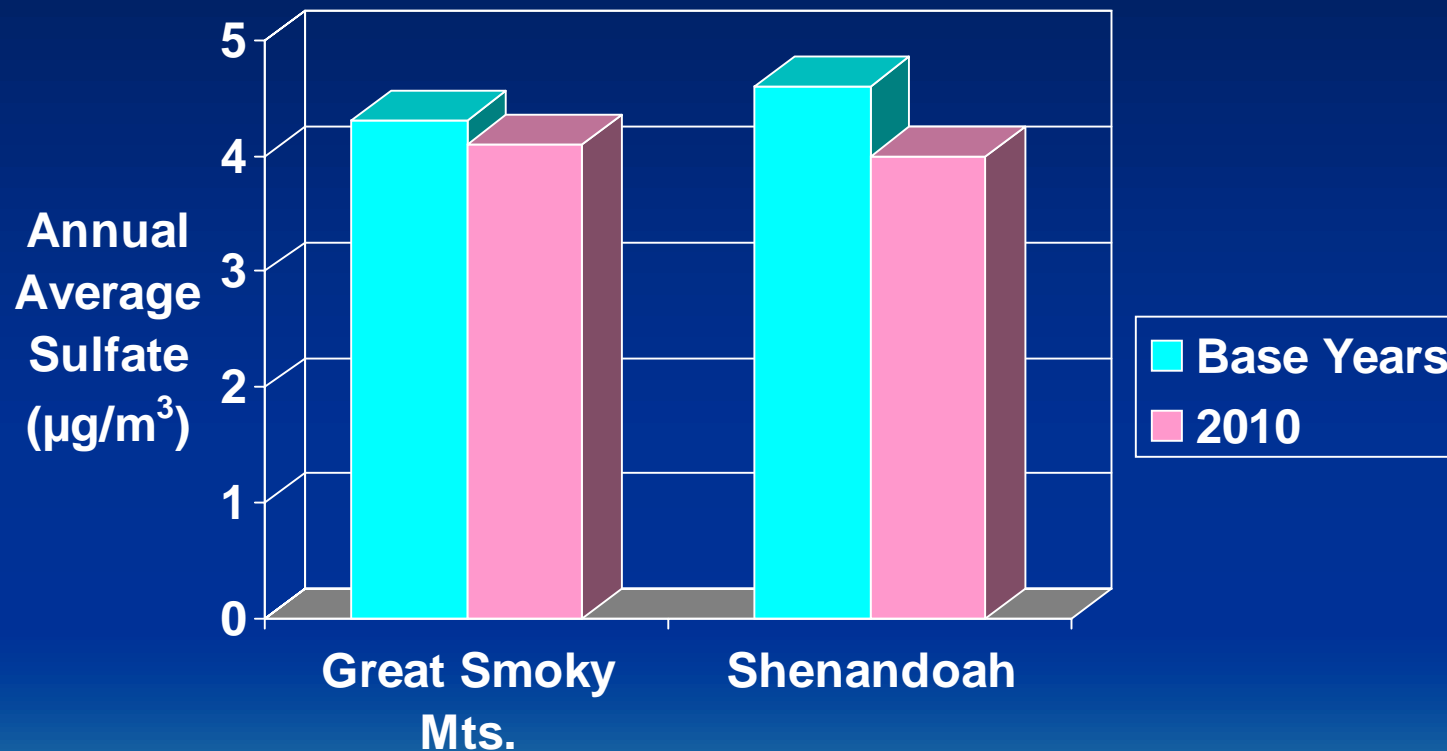


Change in Organics 2.5

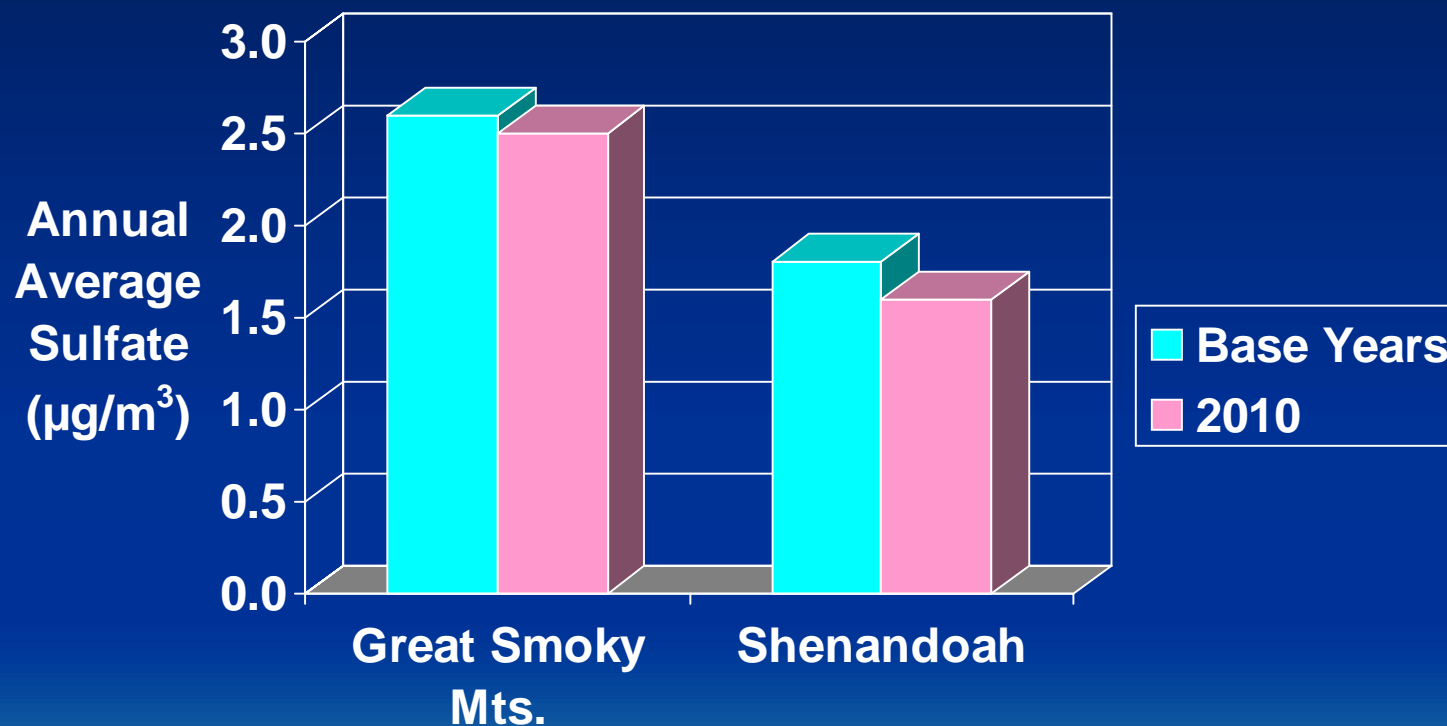
2010 OTW - 1993



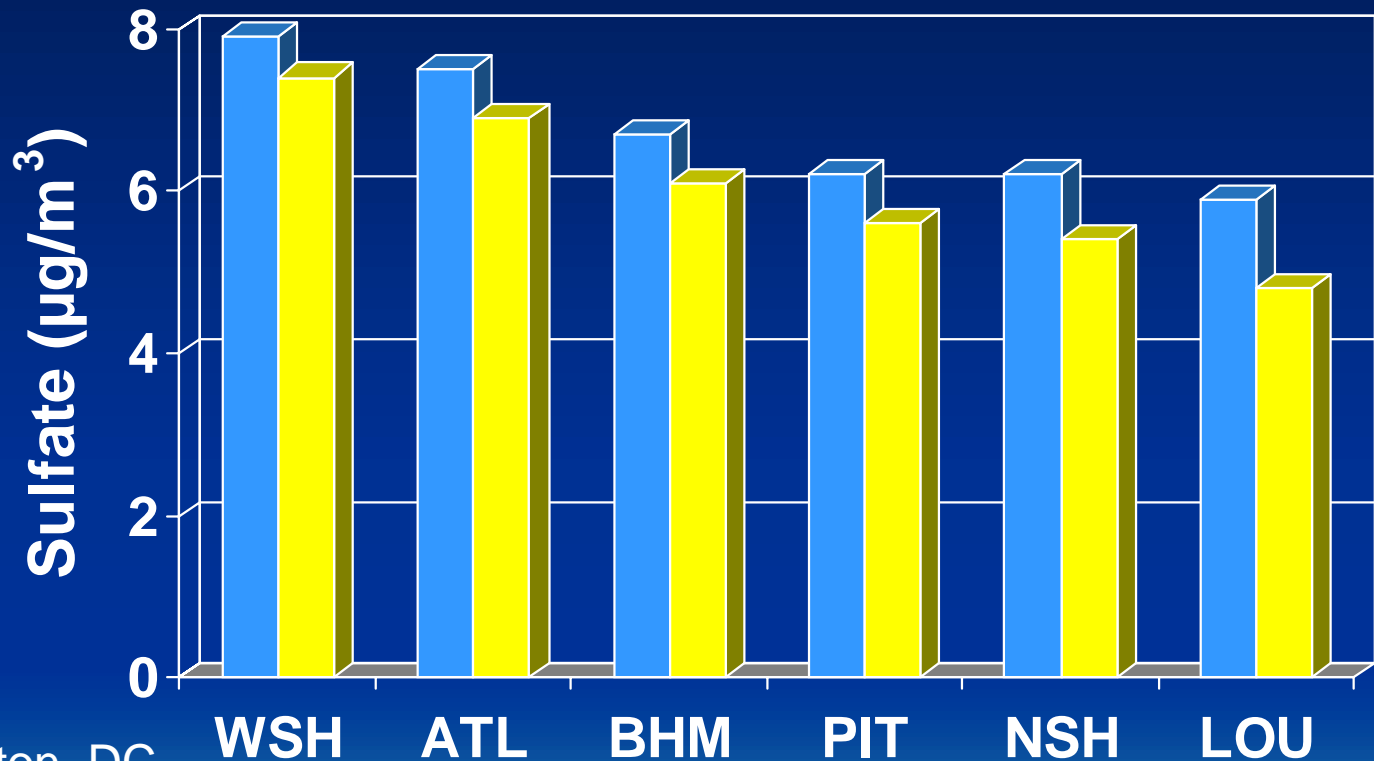
Changes in Annual Sulfate at Shenandoah & Great Smoky Mts.



Changes in Annual Organic Aerosol at Great Smoky Mts. & Shenandoah



Average Sulfate Changes in Selected Urban Areas: 5-19% Decreases



WSH: Washington, DC

ATL: Atlanta

BHM: Birmingham

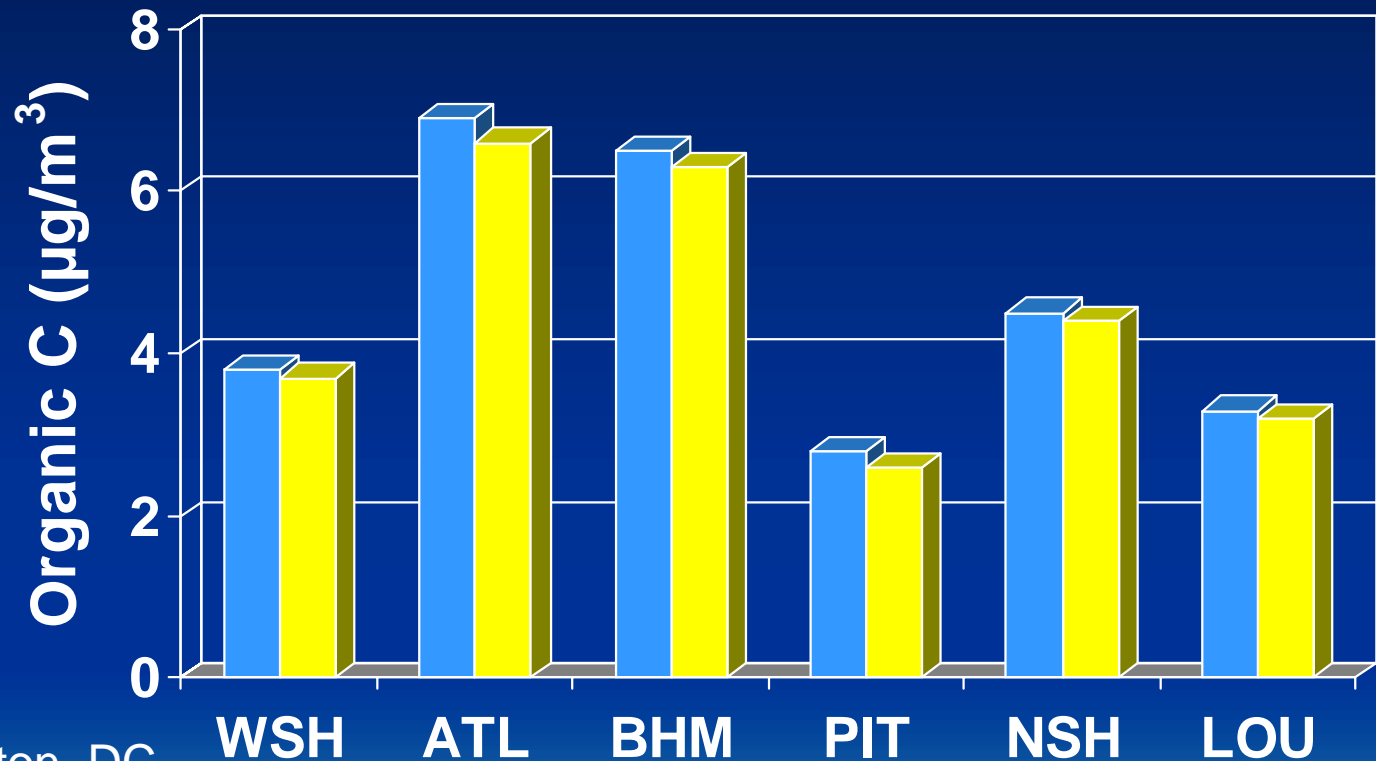
PIT: Pittsburgh

NSH: Nashville

LOU: Louisville

■ Base Years ■ 2010

Average Organic Aerosol Changes in Selected Urban Areas: 1-6% Decreases



WSH: Washington, DC

ATL: Atlanta

BHM: Birmingham

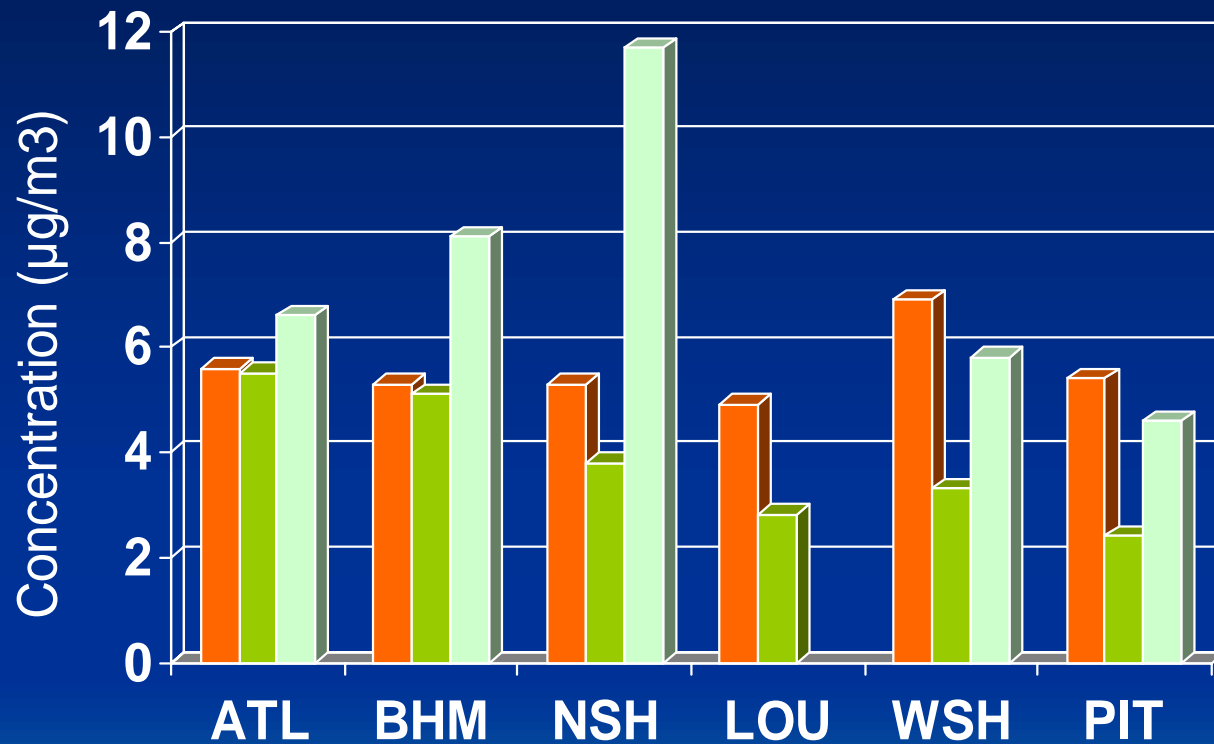
PIT: Pittsburgh

NSH: Nashville

LOU: Louisville

Base Years 2010

Season-Weighted Average Aerosol Levels (2010)



ATL: Atlanta

BHM: Birmingham

NSH: Nashville

LOU: Louisville

WSH: Washington, DC

PIT: Pittsburgh

■ Sulfate ■ Organic Mass ■ Scaled Obs. OM

Summary

- Modeling suggests sulfate and, to a lesser extent, organic aerosols will decrease by 2010 across the eastern U.S.
- Relative reductions in aerosol species will be substantially smaller than associated emission reductions of SO_2 , NO_x and VOCs.
- SAMI modeling appears to underestimate the ratio of organic to sulfate aerosols in cities even while it slightly overestimates this ratio at Class 1 sites.

